

What is Claimed is:

1. An apparatus for removing mercury from a gas stream, the apparatus comprising:

a polyethersulfone surface or a surface coated with an anion exchange resin;

5 and,

elemental iodine disposed thereon.

2. An apparatus according to claim 1 wherein the elemental iodine disposed on the polyethersulfone or resin-coated surface is chemisorbed thereon.

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3. An apparatus according to claim 2 wherein the polyethersulfone or resin-coated surface is selected from the group consisting of external surfaces and interstitial surfaces.

15 4. An apparatus according to claim 1 wherein the elemental iodine is deposited on the polyethersulfone or resin-coated surface by applying a solution of an organic fluid and elemental iodine to the polyethersulfone surface.

5. An apparatus according to claim 1 wherein the temperature of the gas stream  
20 is up to about 300° F.

6. An apparatus according to claim 1 wherein the polyethersulfone or resin-coated surface is a surface of a substrate wherein the substrate is selected from the group consisting of woven material, a fibrous mat, a porous solid, a non-porous solid, and a finely divided solid.

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7. An apparatus according to claim 6 wherein the substrate is a porous solid defining passageways through the solid, and wherein the passageways include at least one polyethersulfone or resin-coated surface.

10 8. An apparatus according to claim 1 which further comprises:  
a chamber including a substrate support, a gas inlet and a gas outlet; and,  
the polyethersulfone or resin-coated surface with the iodine disposed thereon  
disposed within the chamber.

15 9. An apparatus according to claim 4 wherein the solution of pentane and  
elemental iodine comprises elemental iodine dissolved in pentane at a ratio of at least  
0.001 moles per liter.

20 10. An apparatus according to claim 4 wherein the solution of pentane and  
elemental iodine comprises elemental iodine dissolved in pentane at a ratio of at least 0.01  
moles per liter.

11. An apparatus according to claim 4 wherein the solution of pentane and elemental iodine comprises elemental iodine dissolved in pentane at a ratio of between 0.01 and 0.10 moles per liter.

5 12. An apparatus according to claim 4 wherein the solution of pentane and elemental iodine comprises elemental iodine dissolved in pentane at a ratio of about 0.0079 moles per liter.

13. An apparatus according to claim 4 wherein after immersing the  
10 polyethersulfone or ion exchange resin-coated substrate in a solution of pentane and elemental iodine the polyethersulfone or ion exchange resin-coated substrate is then rinsed in pentane.

14. An apparatus according to claim 1 wherein the polyethersulfone or Anion  
15 exchange resin-coated surface is a surface of a substrate wherein the substrate is selected from the group consisting of filter paper, filter tape, and a membrane.